Corn and Soybean Cropping Systems: Profitability of Different Agronomic Management Techniques

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Introduction

Corn and soybean production are a major part of the U.S. agriculture sector, comprising roughly 56% of total principal crops planted per acre (USDA, 2019). In addition, in 2018, corn contributed 25% and soybeans contributed 19%, respectively to the total U.S. crops cash receipts (USDA, 2019). While focusing on the Illinois agriculture economy, IL agriculture makes up a significant portion of the total corn and soybean acreage that is planted. According to the USDA, IL corn and soybean production makes up 13%, and 12%, respectively, of the total corn and soybean acreage that is planted in the U.S. (USDA). Corn and Soybean production is essential to the U.S. economy, and they supply very valued commodities, while supplying everyday necessities to consumers all over the country and world. Those necessities include fuel, oil, medicine, food additives, livestock feed, and much more.

With the benefits to the economy there is also negative impacts that can hinder the environment. The environmental impact of current production agriculture operations in Illinois and across the corn belt have attracted attention in many studies. These studies point out the nutrient over application that then leaches off the farm and the negative impact monocultures have on biodiversity.

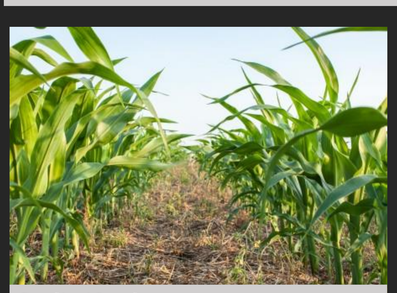

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Figure 1.
Monoculture field of corn that in a no-till setting.
Figure 2.
Monoculture field of soybean in a no-till setting.

Management Techniques

The different management practices that have caught interest to many different studies are:

- Row spacing
- Row Orientation
- Plant Population
- Corn and Soybean Intercropping

Figure 3.
Field Trial demonstrating different agronomic systems and intercropping techniques. Credit Heller 2018.

Methods

- Each experimental unit (plot) is 20 ft in length by 15 ft width, with random replication and organization throughout
- Each plot will be different based on management practice
- Both crops will be planted simultaneously on the same date in a no-till setting
    - No previous or future application of pesticides
- Plots will be maintained throughout growing season
    - Notes will be taken based on growth stages
- Total harvested material will be weighed prior to shelling, shelled, then weighed without extra plant material
- Weights will be converted to yield and then calculated profitability based on total inputs costs

Figure 4.
Field Trial demonstrating different agronomic systems and intercropping techniques. Credit Practical Farmers of Iowa

Objectives

- Help identify impacts from over-applied nutrients
- Highlight changes in production practices
- Examine the changes in the marginality within the grain markets

Research Question –

Profitability of Different Agronomic Management Techniques

<u>Factors Limiting Profitability</u>

- Weather, animals, and other factors out of human control
- No applications of chemicals that would cost money
- Weeds, disease, fungi present within field

<u>Current Research Present within Literature Review Addresses</u>

- Row Spacing
    - Corn and soybean row spacing recommendations based on yield
    - Recommendations based on soil textures, soil drainage, and amount of light penetration
- Row Orientation
    - Comparing North/South planted rows to East/West planted
- Plant Population
    - Recommendations based on length of growing season, kernel size and weight
    - Stalk diameter, root lodging, and stalk lodging could be effected by this factor (Roekel and Jeffrey, 2012)
- Intercropping Techniques
    - Studies present in the Northern hemisphere in Minnesota
    - Corn and soybean planted simultaneously in small plots within China
    - No current research present in the Midwest

What's Next

Data collection for this experiment will take place during Summer of 2020. Preliminary analysis of the experiment is anticipated to be ready by January 2021.